

## Resective Periodontal Therapy in the Management of Advanced Furcation Involvement - A Case Series

Dr. Madhu S. Ratre<sup>1</sup>, Dr. Shaleen Khetarpal<sup>2</sup>, Dr. Ajay Chouksey<sup>3</sup>, Dr. Pratik Chaudhari<sup>4\*</sup>

<sup>1</sup>MDS, Reader, Dept. of Periodontology, Govt. College of Dentistry, Indore, India

<sup>2</sup>MDS, Lecturer, Dept. of Periodontology, Govt. College of Dentistry, Indore, India

<sup>3</sup>MDS, Sr. Lecturer, Dept. of Periodontology, Mansarovar Dental College Hospital and Research Centre, Bhopal, India

<sup>4</sup>MDS, 2<sup>nd</sup> year student, Dept. of Periodontology, Govt. College of Dentistry, Indore, India

### Case Report

\*Corresponding author

Dr. Pratik Chaudhari

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**Abstract:** Successful management of furcation involved (FI) teeth is still a challenge for clinicians. Multirooted teeth are at higher risk of periodontal destruction and early tooth loss due to their complex anatomy and posterior location in the arch. Maintenance of oral hygiene around furcation involved regions is difficult, resulting in early, rapid and severe periodontal destruction. The outcomes of conservative and regenerative therapies are unpredictable in such teeth. Resective periodontal therapy in combination with endodontic and prosthetic treatments, offers a more practical and predictable approach in management of such advanced FI teeth. This multidisciplinary approach not only treats and preserves the tooth along with its periodontium in part, but also restores its function as a whole. This case series presents bicuspidization, hemisection and root resection as resective periodontal therapy in the predictable and successful management of advanced grade II, grade III and grade IV FI teeth.

**Keywords:** Bicuspidization, Furcation involvement, Hemisection, Resective periodontal therapy, Root amputation, Root resection.

### INTRODUCTION

Furcation involvement or invasion (FI) can be defined as loss of periodontal support and attachment i.e. loss of alveolar bone and periodontal ligament in the interradicular space of a multirooted tooth/ teeth. Glickman (1958) had classified the FI lesion into four grades; Grade I indicates incipient or early furcation involvement, Grade II is a cul de sac furcation involvement without a through and through ability to probe.

Grade III furcation involvement is through and through loss of interradicular bone, but clinically not visible and Grade IV is through and through loss of interradicular bone which is clinically visible [1]. Several factors determine the risk of furcation involvement and affect the treatment outcome as well. Tooth related anatomical factors like size of trunk, presence of root concavities, enamel pearls etc; patient related factors like maintenance of oral hygiene habits, dexterity of patient for meticulous home care and clinician related factors influence successful management of FI. Many treatment strategies are being practiced to manage the FI. The objectives of all the modalities are removal of etiology, creation of favorable environment for effective plaque control, prevention of future supporting tissue loss, furthermore, regeneration at the furcation site if possible. Grade I and grade II furcation involvements respond well to nonsurgical as well as simple surgical procedures like gingivectomy, flap debridement with and without odontoplasty or furcationplasty, followed by

meticulous oral hygiene maintenance. Grade II furcation with deep and narrow vertical component can be treated with regenerative approaches. Advanced grade II, grade III and grade IV furcation involvements present unique and formidable problem to the clinician as outcomes of simple nonsurgical, surgical and regenerative approaches are unpredictable in these conditions [2]. Resective procedures are preferred in management of advanced furcation involvements. Root resection, root amputation, radisection, hemisection, bicuspidization and root separation are the used terminologies for different procedures in resective management of advanced furcation lesions. According to the glossary of periodontal terms (1986), root resection is defined as the surgical removal of all or a portion of the root before or after endodontic treatment [3]. Root amputation or radisection has been described as the removal of a root from a multi-rooted tooth. Hemisection has been described as the surgical separation of the roots in a multi-rooted tooth, especially a mandibular molar, through the furcation

area in such a way that a root or roots may be surgically removed with the associated part of the crown. In the literature few more terms are in frequent use such as root separation, which is indicated as the sectioning of the root complex and the maintenance of all roots [4]. Bicuspidization and Bisection terms are used when root separation is performed on mandibular molar sectioning it in two premolars. Farshchian and Kaiser had first described the steps of successful bicuspidization in their case report in 1988.

The purpose of the present case series of bicuspidization, root resection and hemisection, is to discuss the resective management as a viable and practical approach to manage the advanced furcation involvement of teeth.

#### CASE 1

A 55 year old male patient reported with chief complaint of pain and pus formation in left lower back tooth region. On clinical examination grade III furcation involvement with periodontal pocket measuring 5 mm was noticed at the furcation site of 36. Moderate attachment loss was evident with a gingival recession of 2 mm on the facial, mesial and distal surfaces of 36 (Figure 1). Intra oral periapical radiograph (IOPA) of 36 reveals moderate alveolar bone loss in furcation region and roots of 36 (Figure 2). Bicuspidization of the tooth was planned following intentional root canal treatment. After informed consent and local anesthesia a full thickness flap was elevated. Furcation was exposed and thorough debridement was performed. The tooth was hemisected with a diamond bur and both the parts were retained, creating two premolar teeth (Figure 3). All sharp line angles were rounded. Flap approximation was done using 3-0 black silk suture. After a healing period of 15 days metal crowns were planned for both the parts (Figure 4). The patient was recalled after every 3 months for a period of 2 years and

the site was found to be periodontally healthy and stable during the follow up.

#### CASE 2

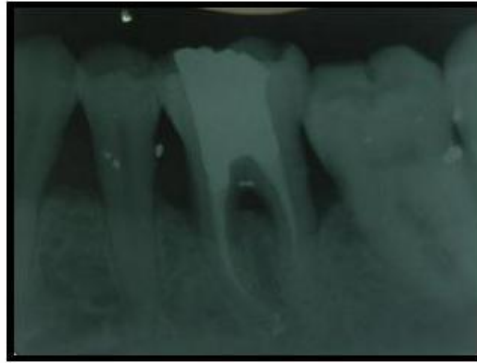
A 65 year old male patient reported with chief complaint of pain in right lower back tooth region since 3 days. History of pus formation and swelling was given by the patient, one month back. Deep periodontal pocket (7mm) with grade III furcation involvement was noticed in tooth number 46 on clinical examination. Also, deep caries involving pulp was evident in same tooth. Tenderness on percussion was present in 46, but the tooth was firm. IOPA showed radiolucency around the mesial root indicating bone resorption at the furcation and periapical regions. There was an adequate bone support around the distal root of 46. A diagnosis of endodontic-periodontal lesion was made. Root canal treatment was completed (Figure 5). Hemisection with removal of mesial half of the tooth was done after two weeks of RCT (Figure 6, Figure 7, Figure 8), which was followed by fixed partial prosthesis after healing of the surgical site (Figure 9). The patient was recalled after every 3 months up to a period of 1 year and the surgical site was satisfactory (Figure 10).

#### CASE 3

A 62 year old male patient reported with chief complaint of pain during chewing in left lower back tooth region for six months. 10 mm periodontal pocket was noticed in relation to the distal root of 36 on clinical examination (Figure 11). Intra oral periapical radiograph revealed bone loss up to the apex along with the furcation region of the distal root of 36 (Figure 12). As the tooth was firm, the patient was unwilling for extraction. After root canal treatment and informed consent, root resection of the distal root of 36 was performed under local anesthesia (Figure 13). During a period of follow up of 2 years the operated site was healthy with adequate maintenance (Figure 14).



Fig-1: Pre-operative image of 36



**Fig-2: Pre-operative image of Intra oral periapical radiograph of 36**



**Fig-3: Vertical section of 36 to split the tooth in two parts and retention of both**



**Fig-4: Prosthetic reconstruction of 36 as two premolars – Bicuspidization**



**Fig-5: Intra oral periapical radiograph of 46 shows radiolucency indicating bone loss in the distal root involving periapical region and furcation region**



**Fig-6: Elevation of mucoperiosteal flap of 46**



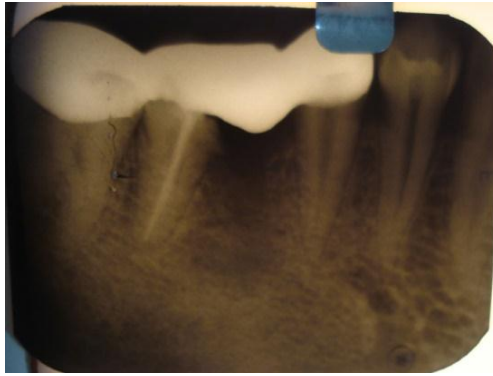
**Fig-7: Hemisected 46 - The tooth was vertically sectioned with extraction of mesial half of the 46**



**Fig-8: Mucoperiosteal flap was replaced and sutured with 3-0 back silk suture**



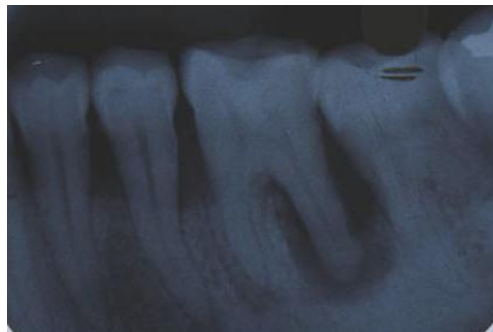
**Fig-9: Prosthetic reconstruction**



**Fig-10: Six month post operative radiograph**



**Fig-11: Deep periodontal pocket involving distal root of 36**



**Fig-12: Radiograph shows severe bone loss involving distal root and furcation region of 36**



**Fig-13: Root resection of distal root of 36**





**Fig-14: One year post operative image shows stable periodontium of 36**

## DISCUSSION

Early diagnosis and prompt treatment is of great importance for successful management of furcation involvement. The majority of the indications for resective management of furcation involved teeth are of periodontal, endodontic or combined periodontic - endodontic origin along with restorative and strategic importance of the tooth [4]. Patient's expectation and cost – benefit ratio are also important issues, at the time of decision making in clinical practice. There are certain clinical considerations which play role in selecting a tooth for easy and complete tooth resective procedures, like root divergence, root form and location of furcation involvement. A tooth with diverged, long and straight roots is predicted to have a favorable outcome after this procedure [5]. An integrated multidisciplinary approach is mandatory for comprehensive management of advanced furcation involved tooth comprising mainly endodontic, periodontic, and prosthodontic modalities. All the factors associated with successful endodontic treatment, periodontal treatment and prosthetic aspects should be evaluated carefully; from the diagnosis to the treatment execution and rehabilitation. Contraindication related to any of this modality will contraindicate the resective management of furcation involved tooth.

The endodontic treatment should be performed prior to the surgical procedure [6]. Thorough and precise debridement, odontoplasty, and osteoplasty should be carried out after mucoperiosteal flap reflection, during periodontal surgery. Clinician must round off all the Sharp edges, line angles and margins of the remaining tooth structure to avoid post operative irritation and ulceration on cheek and tongue. Heavy occlusion points should be adjusted. Special consideration should be given to prosthesis contour and marginal finish for excellent plaque control [7].

In case 1, Bicuspidization was the treatment of choice, as there was interradicular bone loss in the furcation area. Roots were long and adequate bone support was present around the mesial surface of the mesial root and distal surface of the distal root. Elimination of furcation by creating two premolar teeth was a practical option, thereby improving the overall

periodontal status and prognosis. In case 2, there was advanced alveolar bone loss localized around the mesial root and furcation region as a manifestation of endodontic periodontal infection in 46. The roots of the tooth were divergent and long. Root canal was performed. There was good alveolar bone support around the distal root. Hemisection was planned as the desired treatment of choice. In case 3, there was advanced bone loss around the distal root only; hence root amputation was the treatment of choice.

Hamp *et al.* [8] and Carnevalle *et al.* [9] have reported 5-10 year survival rate of resected teeth. Tooth fracture and endodontic complications are found to be the most common causes of failure of resected teeth. Recurrence of periodontal infection due to lack of excellent plaque control, or involvement of other furcations, carious involvement of resected teeth and restorative failure can be the other reasons for failure of resected teeth. Some researchers have evaluated the factors influencing the outcome of root resection therapy for about 10 years and they concluded that root resection has better prognosis in teeth with periodontal problems than non-periodontal problems [10]. They also emphasized that a tooth with more than 50% bone support has better prognosis.

Resective management of furcation involved teeth has been compared with extraction followed by replacement with implants in some studies [11]. Resective treatment of advanced FI was concluded as simple and cost effective approach by the authors. Preservation of part of natural tooth facilitates advantages of natural physiologic tooth mobility, natural bone health maintenance, and natural periodontal proprioception. This approach is more practical and safe in comparison to the implant particularly in surgically difficult regions like region with close proximity to vital structure e.g. nerves and vessels [11].

## CONCLUSION

Hereby, we conclude that resective periodontal therapy is an integral part of the multidisciplinary approach in successful and predictable management of teeth with advanced furcation involvement.

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